Abstract

In my doctoral thesis, I focused on studying the envelope glycoprotein of ALV (Avian Leukosis Viruses), a group of retroviruses infecting Galliformes and inducing a variety of diseases. Eradication of these viruses in the farming industry is in progress and information about the virus spread, namely corresponding receptors, is needed to successfully accomplish this feat. Furthermore, many variants of retroviruses infect cells regardless of the absence of the corresponding receptor, and understanding of this phenomenon is also crucial.

We analyzed a newly emerged subgroup of ALV, termed K for its sequence divergence from other subgroups, and determined its host range, interference, and receptor usage, to confirm whether this group deserves a new letter for its designation. We identified a receptor of ALV-K that proved to be Tva, the receptor also used by ALV-A. However, since the K subgroup differs from the A subgroup by its host range and inhibition by the soluble form of Tva, we expect the two subgroups use different epitopes of the Tva receptor.

We also analyzed a variant of ALV-C exhibiting an extended host range as it successfully infected hamster cells. We found that the extended host range correlates with the ability of the envelope glycoprotein to acquire activated prefusion state prematurely, without interaction with the receptor, which was demonstrated by the same sensitivity to temperature, pH, and selective inhibitors of fusion as other cases of envelope glycoproteins with a propensity for premature activation.

Finally, we tried to understand the cause and mechanism of virus-induced osteopetrosis, a disease characterized by bone enlargement caused by osteoblasts hyperproliferation. We compared the genome of a highly osteopetrotic strain, MAV-2.O, with non-osteopetrotic strains and verified the importance of the envelope glycoprotein gene in osteopetrosis induction. Furthermore, we analyzed its stability and ability to enter the cells lacking its receptor, Tvb.

Keywords: ALV, avian, glycoprotein, receptor, fusion, extended host range, osteopetrosis